

### Remarks

Claims 1-3, 5-12 and 26 and 27 are pending in the present application. Claims 4, 13-25 have been canceled. No claims have been indicated to be allowed.

### 35 USC 103

Claims 1-3, 5, 6 and 8 stand rejected under 35 USC 103 (a) as obvious over Beck et al (4,588,702) in view of Kugler. This rejection is respectfully traversed.

Applicants' invention as now claimed comprises a process for reducing the sulfur content of **liquid** petroleum products produced by the catalytically cracking of a hydrocarbon feed containing organosulfur in a catalytically cracking process, i.e., a FCC process. The process involves subjecting the hydrocarbon feed to an equilibrium cracking catalyst and a product sulfur reduction catalyst under catalytically cracking conditions. The product sulfur reduction catalyst comprises a porous molecular sieve having (i) a first metal component which is within the interior pore structure of the molecular sieve and which comprises vanadium in an oxidation state greater than zero and (ii) a second metal component which is within the interior pore structure of the molecular sieve and which comprises at least one rare earth.

Beck et al. discloses a process for cracking a hydrocarbon feed containing sulfur in the presence of a catalyst containing zeolite, clay and silica-alumina gel. Beck et al. fails to teach or in any way suggest the use of a product sulfur reduction catalyst as claimed by Applicants either alone or in the presence of an equilibrium cracking catalyst to reduce the sulfur content of **liquid** cracked petroleum products obtained from a catalyst cracking process.

Kugler fails to cure the deficiencies of Beck et al. so as to render obvious Applicants' invention as now claimed. Kugler discloses a process for removing vanadium and/or nickel contaminants from a cracking catalyst using a strontium carbonate-trapping agent. Kugler fails to teach or in any way suggest the use of a

product sulfur reduction catalyst as claimed by Applicants in the presence of the equilibrium catalyst to **increase** to amount of vanadium on the catalyst to reduce the content of sulfur in **liquid** petroleum cracked products. In fact, Kugler in effect **teaches away** from Applicants' invention by **removing** vanadium from an equilibrium catalytic cracking catalyst during a catalytic cracking process.

Consequently, neither Beck et al. nor Kugler, alone or in combination, renders Applicants' invention, as now claimed, unpatentable as being obvious. Consequently, this rejection is improper and should now be withdrawn.

Claim 7 stands rejected under 35 USC 103(a) as being unpatentable over Beck et al. (4,588,702) in view of Kugler (4,944,864) as applied to claims 1-3, 5, 6 and 8 above, in further view of Cooper et al. (5,601,798). This rejection is respectfully traversed.

For reasons as stated hereinabove, neither Beck et al. nor Kugler, alone or in combination, renders obvious Applicants' invention, as now claimed. Further, Cooper et al. fail to cure the deficiencies of Beck et al. and/or Kugler, so as to render Applicants' invention unpatentable.

The Examiner has relied upon Cooper et al. to illustrate that USY typically has a unit cell ranging from 24.5 angstroms (2.45 nm) to 24.6 angstroms (2.46 nm) and a silica/alumina ratio ranging from 5-12. However, Cooper fails to in any way teach or suggest a process for the reduction of the sulfur content of a **liquid** petroleum product produced during a catalytic cracking process using a product sulfur reduction catalyst as claimed by Applicants in the presence of an equilibrium cracking catalyst.

Consequently, Applicants' invention is patentable over either of Beck et al., Kugler or Cooper et al., alone or in combination. Accordingly, this rejection is improper and should be withdrawn.

Claims 9-12 stand rejected under 35 USC 103(a) as being unpatentable over Beck et al. (4,588,702) in view of Kugler (4,944,864) as applied to claim 1-3, 5, 6 and 8 above, in view of Occelli (4,615,996). This rejection is respectfully traversed.

For reasons as stated hereinabove, neither Beck et al nor Kugler, alone or in combination, renders obvious Applicants' invention as now claimed. Further, Occelli does not cure the deficiencies of Beck et al. and/or Kugler so as to render Applicants' invention unpatentable.

Occelli discloses a novel catalytic cracking composition comprising a cracking catalyst and, as a separate and distinct entity, a catalytically inactive crystalline aluminosilicate diluent. Occelli fails to in any way teach or suggest a sulfur reduction catalyst as now claimed by Applicants or the use of such a catalyst in the presence of an equilibrium cracking catalyst to reduce the sulfur content of **liquid** petroleum products produced from a catalytic cracking process.

Consequently, Applicants' invention is patentable over either of Beck et al. or Kugler alone or in combination with Occelli.

Accordingly, this rejection is improper and should be withdrawn.

Claims 1-3, 5, 6 and 8-12 stands rejected under 35 USC 103(a) as being unpatentable over Balko et al. (5,956,474) in view of Schorfheide (4,690,806) and Kugler (4,944,864).

Balko discloses a composition for passivating metal contaminants in the catalytic cracking of hydrocarbons. The composition comprises an ultra large pore crystalline material and a metal passivation, e.g. a rare earth, incorporated with the pores of the large pore crystalline material. The composition may be used as an additive or as a component of the cracking catalyst. Balko teaches that cracking catalyst may be a conventional large pore zeolite but preferably a rare

earth exchanged zeolite. Balko further teaches that the catalyst can be ion exchanged with a metal, such as Zn.

Balko is silent with respect to and fails to at all teach a vanadium-containing product sulfur reduction catalyst such as claimed by Applicants or the use thereof for the reduction of the sulfur content of **liquid** petroleum products during a catalytic cracking process in the presence of an equilibrium catalyst. Further, neither the Kugler nor Schorfheide reference cures the deficiencies of Balko so as to render Applicants' invention as now claimed unpatentable.

The Examiner has relied on Schorfheide to illustrate that gas oil is known to contain organosulfur compounds. However, Schorfheide is silent with respect to a product sulfur reduction catalyst as claimed by Applicants or any process for the reduction of sulfur content in **liquid** cracked products during a catalytically cracking process.

As stated hereinabove, Kugler discloses a process for removing vanadium and/or nickel contaminants from a cracking catalyst using a strontium carbonate-trapping agent. Kugler in effect **teaches away** from Applicants' invention by teaching **removing** vanadium from an equilibrium catalytic cracking catalyst during a catalyst cracking process. On the other hand, Applicants' invention teaches the use of a vanadium and rare-earth containing sulfur reduction catalyst to **add or increase** the amount of vanadium on the equilibrium catalyst to accomplish a reduction of sulfur in the **liquid products** produced in a catalytic cracking process.

Consequently, Applicants' invention is patentable over either of Balko et al., Schorfheide or Kugler, alone or in combination.

Claim 7 stands rejected under 35 USC 103 (a) as being unpatentable over Balko et al. (5,965,474) in view of Schorfheide (4,690,806) and Kugler (4,944,864) as applied to claims 1, 3, 5, 6 and 8-12 above, and further in view of Cooper et al. (5,601,790).

For reasons as stated hereinabove, the combination of Balko et al., Schorfheide and Kugler fails to render Applicants invention unpatentable. Cooper et al. does not cure the deficiencies of these references.

The Examiner has relied upon Cooper et al. to illustrate that USY typically has a unit cell ranging from 24.5 angstroms (2.45 nm) to 24.6 angstroms (2.46 nm) and a silica/alumina ratio ranging from 5-12. However, Cooper fails to in any way teach or suggest a process for the reduction of the sulfur content of a **liquid** petroleum products produced during a catalytic cracking process using a product sulfur reduction catalyst as claimed by Applicants in the presence of an equilibrium cracking catalyst.

Consequently, Applicants' invention is patentable over either of Balko et al., Schorfheide, Kugler or Cooper et al., alone or in combination. Accordingly, this rejection is improper and should be withdrawn.

#### Double Patenting

Claims 1-3 and 6-12 stands provisionally rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claims 1, 2 and 4-12 of the co-pending Application No. 09/221,540.

Applicants acknowledge the Examiner's rejection. Upon the indication of allowable claims in the subject application and/or co-pending Application No. 09/221,540, a terminal disclaimer in compliance with 37 CFR 1.321 (c) will be filed as appropriate to overcome this rejection.

Claims 1-3, 6, 8-12 stands provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6, 8 and 11-14 of co-pending Application No. 09/468,452.

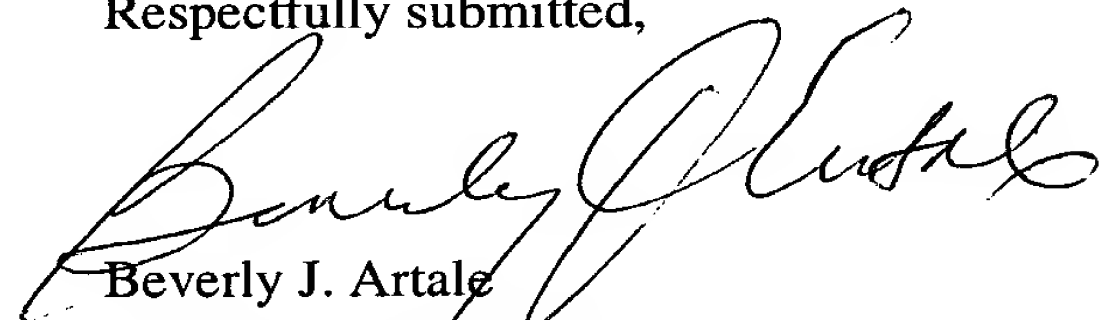
Applicants' acknowledge the Examiner's rejection. Upon the indication of allowable claims in the subject application and/or co-pending Application No. 09/468,452, a terminal disclaimer in compliance with 37 CFR 1.321 (c) will be filed as appropriate to overcome this rejection.

Claims 1-3, 8-10 and 12 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 4, 5 and 10-14 of co-pending Application No. 09/144,607 in view of Beck et al. (4,588,702).

A timely terminal disclaimer in compliance with 37 CFR 1.321 (c) will be filed as appropriate to overcome this rejection upon the indication of allowable claims in the subject application or co-pending Application No. 09/144,602.

Consequently, for reasons as indicated hereinabove, Applicants' invention as claimed is patentable over the prior art of record. Allowance of claims 1-3, 5-12 and 26-27 is respectfully requested.

Respectfully submitted,



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